Итого: 5

Шифр 02

Внесите в таблицу номера правильных ответов. В заданиях, в которых отсутствуют варианты ответов, внесите правильный ответ.

1	2	3	4	5	6	7	8	9	10
–	–	37	-4	16	–	1	–	5	–
–	–	+	–	–	–	+	–	+	–

11	12	13	14	15	16	17	18	19	20
–	5	80	–	–	–	–	3	–	40
–	+	–	–	–	–	–	–	–	+

3) $x^6 + 5x^3 - 6 = 0$ замена $x^3 = y$

$y^2 + 5y - 6 = 0$

$D = 25 + 24 = 49$

$y_1 = -6; y_2 = 1$

$x_1^3 = -6; x_2^3 = 1$

$x_1^6 + x_2^6 = (x_1^3)^2 + (x_2^3)^2 = (-6)^2 + 1^2 = 36 + 1 = 37$ Ответ: 37

4) $\frac{x(x+4)}{\frac{2}{x-9} - \frac{1}{x-5}} = \frac{5}{\frac{1}{5-x} + \frac{2}{x-9}}$

$\frac{x(x+4)}{\frac{2}{x-9} - \frac{1}{x-5}} = \frac{5}{-\frac{1}{x-5} + \frac{2}{x-9}} \Rightarrow x(x+4) = 5$

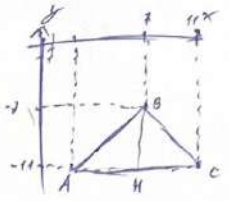
$x^2 + 4x - 5 = 0$

$D = 36 \quad x_1 = -5; x_2 = 1$

$x_1 + x_2 = -5 + 1 = -4$

Ответ: -4

5)



$A(3;11); B(7;-7); C(11;-11)$

$AC = \sqrt{11-3} = 8;$

поступаем высоту BH

$BH = 11 - 7 = 4$

$S_{\triangle ABC} = \frac{1}{2} AC \cdot BH = \frac{8 \cdot 4}{2} = 16$

Отв: 16

7) $\frac{\sqrt{x^2 - 10 - 3x}}{6x - x^2 + 10} \geq 0$

$\sqrt{x^2 - 10 - 3x} \geq 0 \Rightarrow x \in (-\infty; -2] \cup [5; +\infty)$

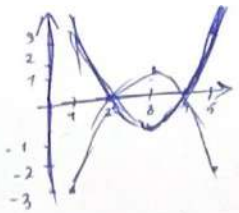
$6x - x^2 + 10 > 0 \Rightarrow x \in (-2; 8)$

$\Rightarrow x \in [5; 8)$ $5 + 6 + 7 = 18$

Ответ: 18

9) $y = |x^2 - 6x + 8|$ $y = a$

$y = \begin{cases} x^2 - 6x + 8 & x \geq 0 \\ -x^2 + 6x - 8 & x \leq 0 \end{cases}$



пересекает 3 точки в $y = -(-1) \Rightarrow a = 1$

Ответ: 1

12) $x^{4 - \lg x} = 1$

$x^{4 - \log_{10} x} = 1$

$x = 1$; $4 - \log_{10} x = 0$

$\log_{10} x = 4$

$x = 10^4 = 10000$

Отв: $1 + 10000 = 10001$

13) $(3^{\sqrt{x-5}} - 1)(4^x - 256) > 0$

$(3^{\sqrt{x-5}} - 3^0)(4^x - 4^3) > 0$

$3^{\sqrt{x-5}} - 3^0 \geq 0$ $\quad 4^x - 4^3 > 0$

$\sqrt{x-5} \geq 0$ $\quad x \geq 3 \Rightarrow x_0 = 4$

$x \geq 5$

$(3x_0 - 2)(x_0 + 2) = 60$

~~$(12 - 2)(6$~~ ~~60~~

Ответ: 60

18) $9^{x^2} + 2 \cdot 3^{x^2} + a = 0$ $\quad x^2 = y$

$z^2 + 2z + a = 0$ $\quad 3 = z$

$D = 4 - 4a \Rightarrow \sqrt{4(a-1)} > 0 \Rightarrow 2\sqrt{1-a} > 0$

$\sqrt{1-a} > 0$

$1 - a > 0$

$-a > -1$

$a < 1$

20) $m_1 = 56$ кг

$\text{вода}_1 = 20\%$

$\text{спирт}_1 = 80\%$ $\Rightarrow$ $56 \cdot \frac{2}{10} = 11.2$ (кг) - вода_1

$56 \cdot \frac{8}{10} = 44.8$ (кг) - спирт_1

$m_2 = ?$

$\text{вода}_2 = 70\% = 11.2$ (кг)

$\text{спирта}_2 = 30\%$

$11.2 \cdot \frac{10}{7} = 16$ (кг) - m_2

$16 \cdot \frac{3}{10} = 4.8$ (кг) - спирт_2

Выпарилась $44.8 - 4.8 = 40$ кг.

4. $\frac{x(x+4)}{\frac{2}{x-9}-\frac{1}{x-5}} = \frac{5}{\frac{1}{5-x}+\frac{2}{x-9}}$

$\frac{x(x+4)}{\frac{2}{x-9}-\frac{1}{x-5}} = \frac{5}{\frac{2}{x-9}-\frac{1}{x-5}}$

$x(x+4)=5$

$\frac{2x-10-x+9}{(x-9)(x-5)} = \frac{x+4}{\frac{x-19}{(x-9)(x-5)}}$

$\frac{x(x+4)(x-9)(x-5)}{x-19} = \frac{x(x+4)(x-9)(5-x)}{x-19}$

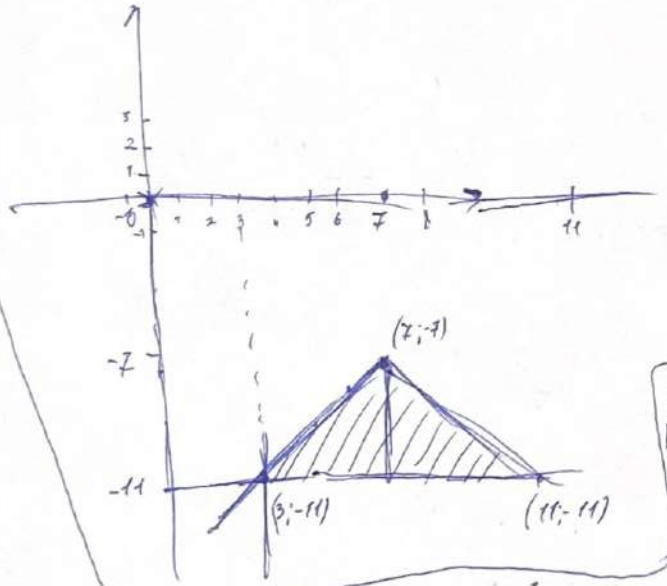
$x^2+4x-5=0$

$D=16+20=36$

$x_1=\frac{-4-6}{2}=-5$; $x_2=\frac{-4+6}{2}=1$

5) $|x-7|+|x+11|\le 4$

x	10	7	6	5	4	3	2
y	8	0	-4	-9	-10	-11	-8



$S_\Delta=\frac{h\cdot a}{2}$

$x^2-3x-10\ge 0$

$D=9+40=49$

$x_1=\frac{3-7}{2}=-2$; $x_2=\frac{3+7}{2}=5$

$x^2-3x-10\ge 0$

$-x^2+6x+16=x^2-6x-16\le 0$

$D=36+64=100$

$x_1=\frac{6-10}{2}=-2$; $x_2=\frac{6+10}{2}=8$

7) $\frac{\sqrt{x^2-3x-10}}{-x^2+6x+16}\ge 0$

$[-\infty;-2]\cup[5;+\infty]$

$12+6=18$

5, 6, 7

1) $a = \frac{1}{\sqrt{8}} + \frac{1}{\sqrt{3}}$ $b = \frac{1}{\sqrt{8}} - \frac{1}{\sqrt{3}}$

$\frac{a^3 - b^3}{(a-b)^3} \neq$

$a^2 - b^2 = (a-b)(a+b)$

$3^2 - 2^2 = 5$

$3 \cdot 2 \cdot 2 + 3$

$1 \cdot 5 = 5$

$8 - 1 = 7$; 12

$a - b$

$37 + 18$

$a^3 = a \cdot a \cdot a = a \cdot a^2$

$a \cdot a^2 - b \cdot b^2$

$(a-b)^3 = (a-b)(a^2 + ab + b^2)$

$2^{-1} = \frac{1}{2}$

$(2^2)^{-1} = \frac{1}{4}$ 2^{-2}

$(2+3)^{-1} = \frac{1}{5}$

$2^{-\frac{1}{2}} + \frac{1}{3} = \frac{5}{6}$

2) $\left(\frac{y - \sqrt[4]{xy^3}}{\sqrt{y} - \sqrt[4]{xy}} + \sqrt{x} \right)^{-1} \frac{2x+y}{\sqrt{x} - \sqrt{y}} = \left(\frac{y - (xy^3)^{\frac{1}{4}}}{y^{\frac{1}{2}} - (xy)^{\frac{1}{4}}} + x^{\frac{1}{2}} \right)^{-1} \frac{2x+y}{\sqrt{x} - \sqrt{y}} =$

$\frac{y - x^{\frac{1}{4}} y^{\frac{3}{4}}}{y^{\frac{1}{2}} - x^{\frac{1}{4}} y^{\frac{1}{4}}} + x^{\frac{1}{2}}$ $\sqrt{y} \cdot x^{\frac{1}{4}} y^{\frac{1}{4}}$

$y - x^{\frac{1}{4}} y^{\frac{3}{4}} + \sqrt{x} y^{\frac{1}{2}}$

$y^{\frac{1}{2}} - x^{\frac{1}{4}} y^{\frac{1}{4}}$

$- y^{\frac{1}{4}} (y^{\frac{1}{4}} + x^{\frac{1}{4}})$

$\sqrt{x}$

$\frac{y - \sqrt[4]{x y^6} + \sqrt{xy} - \sqrt{x}\sqrt{xy^3}}{\sqrt{y} - \sqrt[4]{xy}} = \frac{y - x^{\frac{1}{4}} y^{\frac{3}{4}} + x^{\frac{1}{2}} y^{\frac{1}{2}} - x^{\frac{3}{4}} y^{\frac{1}{4}}}{y^{\frac{1}{2}} - x^{\frac{1}{4}} y^{\frac{1}{4}}}$

$\frac{y^{\frac{1}{2}} - x^{\frac{1}{4}} y^{\frac{1}{4}}}{y - x^{\frac{1}{4}} y^{\frac{3}{4}} + x^{\frac{1}{2}} y^{\frac{1}{2}} - x^{\frac{3}{4}} y^{\frac{1}{4}}} \cdot \frac{2x+y}{x^{\frac{1}{2}} - y^{\frac{1}{2}}} = \frac{-y^{\frac{1}{4}} \cdot (2x+y)}{y - x^{\frac{1}{4}} y^{\frac{3}{4}} + x^{\frac{1}{2}} y^{\frac{1}{2}} - x^{\frac{3}{4}} y^{\frac{1}{4}}} \cdot (x^{\frac{1}{4}} +$

$- 2xy^{\frac{1}{4}} - y^{\frac{1}{4}+\frac{1}{4}}$

$(x^{\frac{1}{4}} y^{\frac{1}{4}})(x^{\frac{1}{2}} + y^{\frac{1}{2}})$

$(x^{\frac{1}{4}} + y^{\frac{1}{4}})$

3) $x^6 + 5x^3 - 6 = 0$ $\quad x^3 = y$

$y^2 + 5y - 6 = 0$

$D = 25 + 24 = 49$

$x_1 = \frac{-5-7}{2} = -6$; $x_2 = \frac{-5+7}{2} = 1$

$x^3 = -6$; 1

$x^6 = (x^3)^2 \Rightarrow x_1^6 = -6^2 + 1^2 = 36 + 1 = 37$

11) $3^{2x+1} + 27 = 82 - 3^x$

$3^{2x+1} + 3^3 = (81+1)\cdot 3^x$

$3^{2x+1} + 3^3 = (3^4+1)\cdot 3^x$

$3^{2x+1} + 3^3 = 3^{4+x} + 3^x$

$3^{2x+1} + 3^3 - 3^{4+x} - 3^x$

$3^{2x}\cdot 3 + 3^3 - 3^4\cdot 3 - 3^x$

$(3^{2x}\cdot 3 - 3^4\cdot 3) + (3^3 - 3^x)$

$3(3^{2x} - 3^4)$

$3(9^x - 81) = (3^x - 27)$

$3^{2x} - 3^4 = \frac{3^x - 3^3}{3}$

$3^{2x} - 3^4 = 3^{x-1} - 3^2$

$3^{2x} - 3^4 + 3^2 = 3^{x-1}$

$81 - 9 = 72$

$3^{2x} - 3^{x-1} = 72$

$3^{2x} - \frac{3^x}{3} - 72 = 0$ $\quad 3^x = y$

$y^2 - \frac{1}{3}y - 72 = 0$

$D = \frac{1}{9} + 288\frac{1}{9} = \frac{2592}{9} = 9\cdot 9\cdot 4\cdot 4\cdot 2$ $\quad 9\cdot 4\sqrt{2} = 36\sqrt{2}$

$x_1 = \frac{\frac{1}{3} - 12\sqrt{2}}{2}$

$x_2 = \frac{\frac{1}{3} + \sqrt{72}\sqrt{2}}{2}$

12) $x^{4-\log_{10} x} = 1$

$x = 1$

$x = 1000$ (1001)

$4 - \log_{10} x = 0$

$\log_{10} x = 4$

$x = 10^4 = 10000$

13)

$(3\sqrt{x-5} - 1)(4^x - 256) > 0$

$(3^{\sqrt{x-5}} - 3^0)(4^x - 4^3) \geq 0$

$3^{\sqrt{x-5}} - 3^0 = 0$ $\quad 4^x - 4^3 = 0$

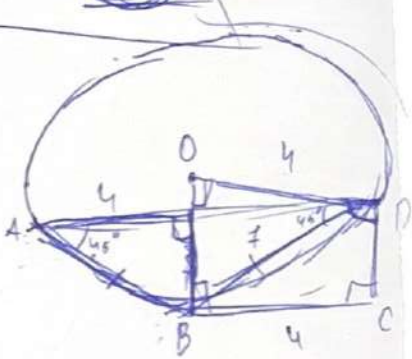
$\sqrt{x-5} = 0$ $\quad x = 3$

$x = 5$

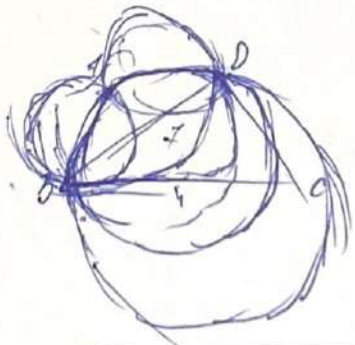
$(3x_0 - 2)(x_0 + 2)$

$(3\cdot 3 - 2)(3+2)$

$7\cdot 5 = 35$



14)



$AD = AO + OD$

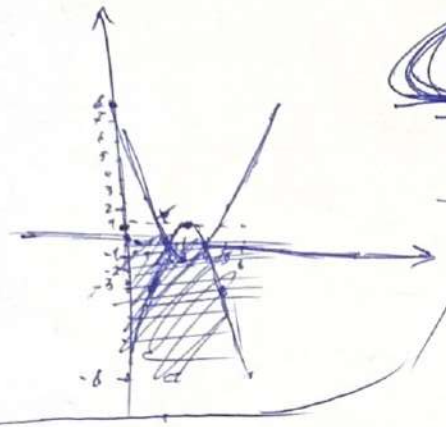
$49 - 16\sqrt{33}$

(8)

$y = |x^2 - 6x + 8|$ $\quad y = a$

$x^2 - 6x + 8 = y \quad x \geq 0$

$(x^2 - 6x + 8) = y \quad x \leq 0$



Отв: 1

x	0	1	2	3
y	3	0	-1	0

$4 - 6 + 3 = -1$

$\frac{\log_6 18}{\log_6 6} + \frac{\log_6 6 \cdot 3}{\log_2 2 \cdot 3} = \frac{\log_6 6 + \log_6 3}{\log_2 2 + \log_2 3}$

$\frac{1 + \log_6 3}{1 + \log_2 3} + \log_6 3 = \frac{1 + \log_2 3}{1 + \log_2 3} = 1$

$\frac{1 + \log_6 3 + \log_6^2 3 + \log_6 3 \cdot \log_2 3}{1 + \log_2 3}$

$3 + \log_2 3 = ?$

$D = 16 - 12 = 4$

$x_1 = \frac{-4-2}{2} = -3; \quad x_2 = \frac{-4+2}{2} = -1$

$\frac{1 + 1 + \log_2 3 + (1 + \log_2 3)^2 + \log_2 3}{1 + \log_2 3}$

$\log_{2\cdot 3} 3 = \log_2 3 + \log_3 3 = 1$

$(3 + 3\log_2 3) + (\log_2 3 + \log_2^2 3)$

$1 + 1 + \log_2 3 + 1 + 2\log_2 3 + \log_2^2 3 + \log_2 3$

$3(1 + \log_2 3) + \log_2 3 (1 + \log_2 3)$

$\frac{3 + 4\log_2 3 + \log_2^2 3}{1 + \log_2 3}$

$\log_2 3 \to x$

$\frac{(3 + \log_2 3)(1 + \log_2 3)}{1 + \log_2 3}$

$x \in (-1; +\infty)$

$\frac{x^2 + 4x + 3}{1 + x}$

$x + 1 \neq 0$

$x \neq -1$

$x > -1$

$x \in (-1; +\infty)$

$x^2 - 2x + 3$

x	0	1	2
y	3	2	3

$\frac{c}{2}$

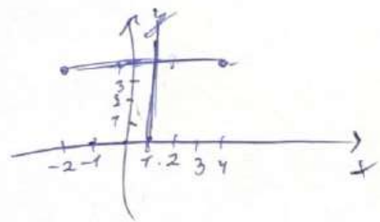
(15)

$x^2 - 3x + 4$

$\frac{b}{2} \to x$

x	0	1	2	3
y	4	2	2	4

15)



2 $0 + 4y + 52 = 0$

$4y = -52$

$y = -13$

(3) y

$-2 + 52$ $4y = 50$

$y = 12.5$

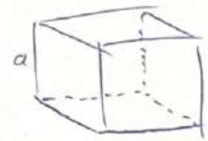
$-8 - 8 = -y$

$y = 16$

$2x + 17 = 4y$

100 20 %

$20 \cdot \frac{10}{2}$



$V = 36$

18 - $9^{x^2} + 2 \cdot 3^{x^2} + a = 0$ $x^2 = y$

$3^{2y} + 2 \cdot 3^{y} + a = 0$ $3^{y} = z$

$z^2 + 2z + a = 0$

$D = 4 - 4a = \sqrt{4(1-a)} \neq 0$

$z_1 = \frac{-2 - 2\sqrt{1-a}}{2} = -1 - \sqrt{1-a}$

$z_2 = \frac{-2 + 2\sqrt{1-a}}{2} = -1 + \sqrt{1-a}$

$2\sqrt{1-a} > 0$

$\sqrt{1-a} > -2$

$1 - a > 4$

$-a > 3$

$a < -3$

$a^3 \sqrt[3]{36}$

$6 \cdot 6 = \sqrt[3]{3 \cdot 2 \cdot 3 \cdot 2}$

$\cos^2 = \sin^2 x + 1$

$\cos^2 x - \sin^2 x = 1$

$\sin^2 x = \cos^2 x - 1$

$2\sin x - 5\cos x = a$

$2\sin x - 5$

$2\cos^2 x - 5\cos x - 2 = a$

$\cos^2 x = y$

$2y^2 - 5y - 2$

$D = 25 + 16 = 41$ $D = 25 - 4 \cdot 2 \cdot (-2 - a)$

$25 + 16 + 4a$

$2\sin x - 5\sin^2 x - 5 = a$

$\sin^2 x = y$

$25 + 16 \ldots$

$\frac{41}{4}$ 7

56 km   80%

$\frac{56 \cdot 2}{10}$ 11.2 (B)   44.8 (C)

$56 \cdot 20\%$

$11.2 \cdot \frac{7}{10}$ $11.2 \cdot \frac{10}{7}$

$-5y^2 + 2y - 5 + a = 0$

$5y^2 - 2y + 5 - a = 0$

$D = 4 + 20(5 - a) = 4 + 100 - 20a = 104 - 20a > 0$

$20a < 104$

$a < 5.1$

41 16. 1.6

$112 \mid 7$ 16 → $16 - 11.2 = 4.8$ (C)

40 km

16.0
11.2
4.8